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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/717,246 | 11/18/2003 | Edward William Adams | 7725-0001.10 | 7752 |
| 23980 | 7590 | 12/10/2004 | EXAMINER | |
| REED INTELLECTUAL PROPERTY LAW GROUP 800 MENLO AVENUE, SUITE 210 MENLO PARK, CA 94025 | | | TSOY, ELENA | |
| | | ART UNIT | PAPER NUMBER | |
| | | 1762 | | |

DATE MAILED: 12/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|------------------------|------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/717,246 | ADAMS ET AL. |
| | Examiner Elena Tsoy | Art Unit 1762 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 18 November 2003.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-9 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-9 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>11/18/2003</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, lines 4-5, "to provide an admixture of dispersant and nanoparticles in solution" renders the claim indefinite because it is not clear whether dispersant and nanoparticles, singly or both, form a solution or just an admixture which further is subjected to step (b).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 6, 7, 9 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bawendi et al (US 6,319,426).

Bawendi et al disclose a method for preparing a population of water-dispersible (See column 3, lines 66-67) semiconductor nanocrystals, comprising coating passivated (hydrophobic) semiconductor nanocrystals (See column 12, lines 64-67) with an outer layer that stabilizes the semiconductor nanocrystal in aqueous solution (See column 13, lines 1-5). The outer layer includes **any** molecule having at least one hydrophobic linking moiety that attaches to the surface of the particle and that terminates in at least one hydrophilic moiety (amphipathic dispersant) (See column 13, lines 5-28) that can be crosslinked to or polymerized with its neighboring molecules to provide stability to the layer by creating an effectively multidentate ligand across the semiconductor surface as illustrated schematically in FIG. 3 (See column 15, lines 23-32). The outer layer may be comprised of a block copolymer having at least one hydrophilic and hydrophobic functionalities (See column 15, lines 55-67; column 16). The hydrophilic functionality can be a polar or charged (positive or negative) group. The polarity or charge of the group provides the necessary hydrophilic interactions with water to provide stable solutions or suspensions of the semiconductor nanocrystal. Exemplary hydrophilic groups include carboxylic acid groups (See column 14, lines 8-27, column 16, lines 10-67). The outer layer may be coated by adding a nonaqueous solvent to a heated mixture of hydrophobic semiconductor nanocrystals with e.g. 30- fold molar excess of the amphipathic molecule having carboxylic acid functional groups (ionizable groups) to form a solution, i.e. admixing hydrophobic semiconductor nanocrystals with e.g. 30- fold molar excess of the amphipathic molecule thereby forming coated semiconductor nanocrystals in the nonaqueous solvent such as

THF (See column 21, lines 51-59), rendering the coated semiconductor nanocrystals water-soluble by deprotonation of the carboxylic acid functional groups of the amphipathic molecule by adding a suspension of potassium t-butoxide ionizing agent) in THF to the amphipathic molecule-semiconductor nanocrystal/THF solution (See column 21, lines 61-67), removing the solvent, drying and transferring the coated deprotonated semiconductor nanocrystals to water (See column 21, lines 61-67; column 22, lines 1-5).

Even if it could be argued that the amphipathic molecule is not a polymer having carboxylic acid functional groups but only a monomer with the carboxylic acid functional groups, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polymer having carboxylic acid functional groups instead of the monomer with the expectation of providing the desired coated water-dispersable semiconductor nanocrystals because Bawendi et al teach that any molecule having at least one hydrophobic linking moiety that attaches to the surface of the particle and that terminates in at least one hydrophilic moiety can be used as the outer layer.

6. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al (US 6,319,426) in view of Powers et al (US 5,162,445).

Bawendi et al are applied here for the same reasons as above. Bawendi et al fail to teach that a base (Claim 4) such as a nitrogenous base or an inorganic hydroxide is used for neutralizing carboxylic acid groups (Claim 5).

Powers et al teach that carboxylic acid groups can be was neutralized in THF solution with either potassium t-butoxide or tetrabutylammonium hydroxide (See example 103).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used tetrabutylammonium hydroxide in Bawendi et al instead of potassium t-butoxide with the expectation of providing the desired deprotonation, since Powers et al teach that carboxylic acid groups can be neutralized in THF solution with either potassium t-butoxide or tetrabutylammonium hydroxide.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al (US 6,319,426).

Bawendi et al are applied here for the same reasons as above. Bawendi et al fail to teach that the number ratio of the amphipathic dispersant to the plurality of nanoparticles in step (a) is in the range of approximately 50:1 to approximately 5000:1.

Although Bawendi et al teach a 30-fold excess of the amphipathic molecule in example 2, one of ordinary skill in the art at would know that the amount of the amphipathic molecule would depend on particular amphipathic molecule used.

It is held that concentration limitations are obvious absent a showing of criticality. *Akzo v. E.I. du Pont de Nemours 1 USPQ 2d 1704 (Fed. Cir. 1987)*.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant concentration parameters (including those of claim 8) in Bawendi et al through routine experimentation in the absence of a showing of criticality.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is (571) 272-1429. The examiner can normally be reached on Mo-Thur. 9:00-7:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy
Examiner
Art Unit 1762

ELENA TSOY
PRIMARY EXAMINER
ETSOY

December 7, 2004